Health Literacy and Use of Outpatient Physician Services by Medicare Managed Care Enrollees

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OBJECTIVE: **To determine whether inadequate functional health literacy adversely affects use of physician outpatient services.**

DESIGN: **Cohort study.**

SETTING: **Community.**

PARTICIPANTS: **New Medicare managed care enrollees age 65 or older in 4 U.S. cities (*N* = 3,260).**

MEASUREMENTS AND MAIN RESULTS: **We measured functional health literacy using the Short Test of Functional Health Literacy in Adults. Administrative data were used to determine the time to first physician visit and the total number of visits during the 12 months after enrollment. The time until first visit, the proportion without any visit, and adjusted mean visits during the year after enrollment were unrelated to health literacy in crude and multivariate analyses. Participants with inadequate and marginal health literacy were more likely to have an emergency department (ED) visit than those with adequate health literacy (30.4%, 27.6%, and 21.8%, respectively; *P* = .01 and *P* < .001, respectively). In multivariate analysis, the adjusted relative risk of having 2 or more ED visits was 1.44 (95% confidence interval, 1.01 to 2.02) for enrollees with marginal health literacy and 1.34 (1.00 to 1.79) for those with inadequate health literacy compared to participants with adequate health literacy.**

CONCLUSIONS: **Inadequate health literacy was not independently associated with the mean number of visits or the time to a first visit. This suggests that inadequate literacy is not a major barrier to accessing outpatient health care. Nevertheless, the higher rates of ED use by persons with low literacy may be caused by real or perceived barriers to using their usual source of outpatient care.**

KEY WORDS: **educational status; emergency medicine; literacy; office visits.**
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The 1993 National Adult Literacy Survey found that over 40 million U.S. adults had very poor reading abilities, which could limit their ability to perform everyday tasks required to function in our society.[1] Moreover, many patients struggle to read and comprehend even the simplest materials commonly encountered in health care settings, such as prescription bottles and appointment slips.[2,3]

It is unclear whether inadequate functional health literacy adversely affects access to care. In focus groups and individual interviews, many patients with inadequate health literacy said that their reading difficulties deterred them from seeking health care because of fear that their low health literacy would be revealed, rude treatment by staff when they struggled to read forms, and difficulty finding their way around health care facilities.[4] However, few quantitative studies have examined whether individuals with inadequate health literacy have fewer outpatient physician visits. Weiss found no relationship between health literacy and costs for outpatient medical care among a random sample of Medicaid recipients in Arizona.[5] Baker et al. found no relationship between health literacy and the number of outpatient visits over the previous 3 months.[6] However, this study enrolled only patients seeking care through the emergency department (ED) and analyzed self-reported physician visits over the previous 3 months. Thus, the selection bias for study entry and the imprecision of the outcome variable could have obscured any relationship between health literacy and outpatient physician use. It is important to understand whether literacy adversely affects use of outpatient services, because this could partly explain why individuals with inadequate literacy have higher hospitalization rates.[7,8]

We conducted this study to determine whether individuals with inadequate health literacy who were newly enrolled in Medicare managed care plans in 4 U.S. cities had lower rates of outpatient physician visits than enrollees with adequate health literacy. Use of outpatient physician visits is a widely used measure of access to care.[9–11] The main outcomes of interest were time to first physician visit following enrollment, number of outpatient physician visits during the first year, and whether an enrollee had no physician visit during the first year. In addition, we conducted secondary analyses to examine differences in the frequency of ED visits.

METHODS

The study design for this project was approved by the Institutional Review Boards at MetroHealth Medical Center, USQA Center for Health Care Research, and Emory University. Patient enrollment and data collection for this study have been described in detail previously.[3] A consecutive series of new Medicare managed care enrollees in Cleveland, Houston, Tampa, and South Florida were

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all eligible. The target number of study participants for the Literacy and Health of Medicare Managed Care Enrollees project was based on the number needed to detect a 25% higher risk of hospitalization among individuals with inadequate health literacy compared to individuals with adequate health literacy (e.g., 2,413 patients with adequate literacy and 20% hospitalization rate, and 724 patients with inadequate literacy and 25% hospitalization rate; power 0.80). Because outpatient visits are more common than hospitalization and can be analyzed as a continuous variable rather than a dichotomous outcome, we assumed that the power of the study to detect a difference in outpatient visit use would be much greater than that required to detect a clinically important difference in hospitalization rates; thus, separate power calculations were not performed for the ability to detect differences in outpatient use, although this was a prespecified study aim.

A letter of introduction describing the study and ensuring confidentiality was sent 3 months after enrollment to each member 65 years of age or older. One week later, interviewers called to determine eligibility. Individuals who indicated they were not comfortable speaking either English or Spanish; were blind or had a severe vision problem that could not be corrected with glasses; or did not know what year or month it was, what state they lived in, what year they were born, or their address, were ineligible.

Baseline Interview and Health Literacy Testing

Eligible individuals who agreed to participate completed a 1-hour face-to-face interview in their home. The survey consisted of questions to determine demographics, years of school completed, income, current and past smoking behavior, current alcohol use, problem drinking as measured by the CAGE questionnaire,[12] chronic conditions (hypertension, diabetes, heart disease, chronic obstructive pulmonary disease or asthma, arthritis, or cancer), depression (measured by the Geriatric Depression Scale),[13] and self-rated physical and mental health (measured by the SF-12).[14] The Mini Mental State Exam (MMSE) was administered using a standardized format with a maximum score of 30.[15] Individuals were classified as non-Hispanic white, non-Hispanic black, native English-speaking Hispanic, native Spanish-speaking Hispanic, and other. Annual income was measured by having respondents select from 1 of 8 income categories.

The last section of the survey assessed the enrollee's health literacy using the short version of the Test of Functional Health Literacy in Adults (S-TOFHLA).[16] The S-TOFHLA uses actual materials that patients might encounter in the health care setting to test their reading ability. The reading comprehension section is a 36-item test using the modified Cloze procedure; that is, every fifth to seventh word in a passage is omitted and 4 multiple choice options are provided.[17] Participants read the passage and select the multiple choice option that best completes the blank given the context of the surrounding phrases. The reading comprehension section measures the ability to read and understand prose passages selected from instructions for preparation for an upper gastrointestinal tract radiograph series, and the patient "Rights and Responsibilities" section of a Medicaid application. Readability levels of these passages on the Gunning-Fox index are grade 4.3 and 10.4, respectively.

The numeracy section of the S-TOFHLA is a 4-item measure using actual hospital forms and labeled prescription vials. It tests a person's ability to comprehend directions on 2 prescription bottles, to determine whether a blood glucose value is within a normal range, and to identify appointment instructions using an actual appointment slip. Participants are given a prop to read and then asked a question; they are allowed to look back at the prop for as long as they would like to answer the question. The numeracy score is multiplied by 7 ($\times$ 4 items) to create a score from 0 to 28, and each item in the reading comprehension section is multiplied by 2 ($\times$ 36 items) to create a score from 0 to 72. The sum of the 2 sections yields the S-TOFHLA score, which ranges from 0 to 100. Scores from 0 to 55 indicate inadequate health literacy; these individuals will often misread the simplest materials, including prescription bottles and appointment slips. Scores between 56 and 66 indicate marginal health literacy, and scores from 67 to 100 indicate adequate health literacy; the latter group will successfully complete most of the reading tasks required to function in the health care setting, although they may still misread the most difficult numerical information. The S-TOFHLA takes 12 minutes or less to administer, and it has been shown to have good internal consistency reliability (Cronbach's α = 0.98 for all items combined) and validity compared to the long version of the TOFHLA[18] (Spearman's correlation 0.91) and the Rapid Estimate of Adult Literacy in Medicine[19] (Spearman's correlation coefficient 0.80).

Prior to completing the S-TOFHLA section, each enrollee's vision was examined using the Rosenbaum Handheld Vision Chart. Those whose corrected vision was 20/50 or better were administered the standard S-TOFHLA (12-point font). Those whose vision was 20/70 to 20/100 were administered the large print version (14-point font) of the S-TOFHLA. Participants whose corrected vision was worse than 20/100 could not have their reading skills accurately assessed, so they were excluded from analysis (N = 71). Respondents who indicated that they could not read at all (N = 10) were assigned a score of 0.

Outpatient Physician Visits

Patients were enrolled in the study between May and December of 1997. We used claims data to identify all outpatient physician visits (including office, clinic, and ED visits) within 1 year of the date of enrollment into the plan (which was generally about 3 months prior to study enrollment). Emergency department visits that resulted in hospitalization do not appear as a separate visit in the claims data and therefore were not included in this analysis. The

date of the first outpatient physician visit (any type), the total number of outpatient visits, and the total number of ED visits were then determined.

Statistical Analysis

Analyses were conducted using SAS, version 6 (SAS Institute, Cary, NC) and Stata, version 7.0 (Stata Corporation, College Station, Tex). Differences in the proportion of patients with no physician visit within the first year for patients with adequate, marginal, and inadequate health literacy were analyzed using pairwise χ^2 tests, with adequate health literacy as the reference group. Multivariate logistic regression models were conducted adjusting for age, gender, race/ethnicity, primary language (English or Spanish), income, years of school completed, health behaviors (smoking, alcohol use, CAGE score), body mass index, number of chronic diseases, self-reported physical and mental health, depression, study site, and total months of enrollment. A total of 16% of participants refused to give income information. To decrease the effect of nonresponse bias, income was imputed using S-PLUS; the results were similar when we only included individuals who reported their income.

The mean time to first outpatient physician visit (among those with at least 1 visit) and the mean number of outpatient visits were analyzed using analysis of variance, Kaplan-Meier curves, and unadjusted Cox proportional hazards models. Multivariate survival analysis and linear regression was conducted using the same covariates listed above. Participants were censored from survival analyses if they disenrolled or died. Because of the highly skewed nature of the number of visits, we repeated analyses using a natural log transformation, which gave an approximately normal distribution. Finally, we created a variable for the total number of ED visits with values of 0, 1, or ≥2 visits. We then used bivariate and multivariate polytomous logistic regression to analyze differences in ED use according to health literacy level. Interaction terms between health literacy and other covariates in the model were examined, but none affected our results. In all analyses, a 2-sided *P* value of .05 was used to determine statistical significance.

RESULTS

A total of 7,471 enrollees were contacted by telephone 3 months after they enrolled in Prudential HealthCare. Of these, 3,390 refused to participate, 737 did not meet eligibility criteria, and 3,344 completed the in-home interview. A total of 84 individuals were excluded because they did not complete the S-TOFHLA, leaving 3,260 participants available for analysis. Nonresponders were more likely to be age 85 or older (7.5% vs 5.4%) and more likely to be male (45.2% vs 42.6%). Nonresponders also lived in ZIP code areas with a higher median per capita income (27.8% lived in an area with a median per capita income of greater than $17,842 per year vs 10.7% of responders) and higher educational attainment.

Among participants, individuals with inadequate health literacy were older, more likely to be nonwhite, and had lower income and education than individuals with adequate health literacy (Table 1). They were less likely to have ever smoked cigarettes, less likely to have used alcohol during the past month, and their health status was worse than those with adequate health literacy (Table 1).

The risk of having no physician visit during the first year after enrollment was similar for participants with adequate (8.1%), marginal (9.3%), and inadequate functional health literacy (9.8%; Table 2). The results were unchanged in multivariate analysis (Table 2). The time to first outpatient visit was also similar based on Kaplan-Meier curves (Fig. 1) and multivariate Cox proportional hazards models (Table 2).

Among patients with at least 1 outpatient physician visit ($N = 2,978$), the mean number of visits over the first year was 13.7 (95% confidence interval [CI], 13.0 to 14.3) for participants with adequate health literacy, 14.0 (95% CI, 12.4 to 15.5) for those with marginal health literacy, and 15.3 (95% CI, 14.2 to 16.3) for those with inadequate health literacy. The median number of visits was 9 for those with adequate health literacy, 8 for those with marginal health literacy, and 9 for those with inadequate health literacy. After adjusting for the worse health status of participants with limited health literacy and the other covariates listed above, participants with marginal health literacy averaged 0.80 fewer visits (95% CI, –2.41 to 0.82), and those with inadequate health literacy averaged 0.59 fewer visits (95% CI, –1.91 to 0.72) than participants with adequate health literacy (Table 2). The results were similar when we used a natural logarithm transformation of the number of visits as the dependent variable (Table 2).

Participants with inadequate health literacy and marginal health literacy were *more* likely to have an ED visit than participants with adequate health literacy (30.4%, 27.6%, and 21.8%, respectively; $P = .01$ and $P < .001$ for comparison to those with adequate health literacy, respectively; Table 2). Almost all of this difference was due to the proportion of participants with 2 or more ED visits (13.4%, 12.3%, and 6.8%, respectively; $P < .001$ for both compared to those with adequate health literacy; Fig. 2). In multivariate analysis (with a polytomous outcome of 0, 1, or ≥2 visits), the risk of having 2 or more ED visits was 1.44 (95% CI, 1.01 to 2.02) for those with marginal health literacy and 1.34 (95% CI, 1.00 to 1.79) for those with inadequate health literacy compared to participants with adequate health literacy (Table 2). The adjusted risk of having a single ED visit was 1.01 (95% CI, 0.76 to 1.33) for those with marginal health literacy and 1.07 (95% CI, 0.86 to 1.33) for those with inadequate health literacy compared to participants with adequate health literacy (Table 2).

DISCUSSION

Our results suggest that inadequate health literacy has little or no independent association with the total number of outpatient physician visits among Medicare managed

Table 1. Participant Characteristics by Literacy Level According to the Short Test of Functional Health Literacy in Adults

	Adequate (*N* = 2,094)	Marginal (*N* = 366)	Inadequate (*N* = 800)
Mean age, y (SD)*	71.6 (5.6)	74.1 (6.3)	75.6 (7.2)
Female, %	57.9	53.8	57.8
Race/ethnicity, %*			
White	84.0	68.0	25.2
African American	6.6	12.6	58.6
Hispanic, English-speaking	1.6	2.5	2.3
Hispanic, Spanish-speaking	6.6	16.4	13.0
Other	1.2	0.6	1.0
Annual income, %*			
<$15,000	36.6	56.0	67.1
$15,000–$24,999	34.3	29.2	24.8
$25,000–$49,999	22.7	12.6	7.0
>$50,000	6.4	2.2	1.1
Years of school completed, %*			
0–8	7.1	24.2	40.9
9–11	14.9	25.6	24.3
12 or GED	38.3	30.2	22.8
>12	39.7	20.0	12.0
Smoking, %*			
Never	38.3	42.6	45.1
Former	49.2	44.8	42.9
Current	12.6	12.6	12.0
Current alcohol use, %*†			
None	58.5	64.7	75.1
Light-moderate	37.5	33.3	23.3
Heavy	4.0	1.9	1.6
≥2 Positive responses on CAGE, %	7.9	7.9	13.7
Number of chronic conditions, mean ± SD‡	1.9 (1.4)	2.1 (1.5)	2.2 (1.5)
Physical Health Summary Scale, mean ± SD§	46.4 (10.7)	43.7 (11.7)	41.9 (11.9)
Mental Health Summary Scale, mean ± SD§	55.6 (8.0)	55.1 (9.2)	52.2 (10.7)

* P < *0.01 for comparison across all 3 groups.*
† *Current alcohol use was classified as light-moderate for men who said they had 1 to 14 drinks of alcohol over the last month, and women who said they had 1 to 7 drinks of alcohol over the last month. Those who drank more than this were classified as heavy drinkers.*
‡ *Chronic conditions included hypertension, diabetes, heart disease, chronic obstructive pulmonary disease or asthma, arthritis, or cancer.*
§ *Physical and mental health were measured using the SF-12 Physical and Mental Health Summary Scales.*
SD, standard deviation.

care enrollees. In multivariate analyses, people with inadequate health literacy tended to be more likely to have no physician visit and have a longer time until their first visit than people with adequate health literacy. However, these differences were small and did not reach statistical significance. Although our results cannot be generalized to younger individuals and people who are not enrolled in a managed care plan, our findings are consistent with a previous study that enrolled younger, predominantly uninsured patients, and found that health literacy was not independently associated with self-reported number of outpatient visits over the previous 3 months.[6]

Use of outpatient physician visits is one of our oldest indicators of access to health care, particularly for individuals with chronic medical conditions.[9–11] Although the total number of outpatient visits is an imperfect indicator of access to care,[8,20] major barriers to health care access (e.g., lack of health insurance) are usually reflected in lower rates of outpatient physician visits.[21–24] Thus, the similar overall rates of health care use seen in this study suggest that inadequate health literacy is probably not a major barrier to health care access. This conclusion is further supported by a previous study that found patients with inadequate health literacy were equally likely to report problems with access to care compared to patients with adequate health literacy.[6]

Our findings suggest that the higher hospitalization rate that we have previously reported for patients with inadequate health literacy in this study population[8] was not due to underuse of outpatient services. Future studies designed to understand why persons with inadequate health literacy have higher hospitalization rates should focus on other possible explanations, such as delays in seeking care for acute health problems, worse quality of care, and poor self-management skills for patients with chronic diseases. Several studies have shown that patients with inadequate health literacy who have chronic diseases have less understanding of their disease and the things they need to do to stay healthy.[25–28]

Our conclusion that inadequate health literacy does not appear to adversely affect access to care must be tempered somewhat because of our secondary finding that patients

Table 2. Outpatient Physician Visits During the Year After Enrollment by Functional Health Literacy Level

	Adequate (*N* = 2,094)	Marginal (*N* = 366)	*P* Value	Inadequate (*N* = 800)	*P* Value
Total Outpatient Visits*					
No physician visit					
Crude risk, *N* (%)	170 (8.1)	34 (9.3)	.45	78 (9.8)	.16
Adjusted odds ratio (95% CI)‡	Ref	1.23 (0.82 to 1.85)	.32	1.23 (0.88 to 1.72)	.22
Time to first visit, days					
Crude hazard ratio (95% CI)	Ref	0.94 (0.82 to 1.04)	.28	1.00 (0.90 to 1.07)	.90
Adjusted hazard ratio (95% CI)‡	Ref	0.89 (0.78 to 1.00)	.06	0.94 (0.84 to 1.04)	.22
Total physician visits†					
Unadjusted mean visits (95% CI)	13.7 (13.0 to 14.3)	14.0 (12.4 to 15.5)	.74	15.3 (14.2 to 16.3)	.01
Adjusted mean visits (95% CI)‡	14.3 (13.7 to 15.0)	13.5 (12.1 to 15.0)	.34	13.7 (12.7 to 14.8)	.38
Unadjusted mean ln(visits) (95% CI)	2.19 (2.15 to 2.23)	2.20 (2.09 to 2.30)	.89	2.32 (2.24 to 2.39)	.03
Adjusted mean ln(visits) (95% CI)‡	2.23 (2.19 to 2.28)	2.17 (2.07 to 2.27)	.27	2.21 (2.14 to 2.28)	.62
Emergency Department Visits					
Any ED visit, *N* (%)	456 (21.8)	101 (27.6)	.01	243 (30.4)	<.001
1 ED visit, *N* (%)	313 (15.0)	56 (15.3)		136 (17.0)	
Crude relative risk (95% CI)	Ref	1.09 (0.83 to 1.40)	.53	1.23 (1.02 to 1.47)	.03
Adjusted relative risk (95% CI)‡	Ref	1.01 (0.76 to 1.33)	.93	1.07 (0.86 to 1.33)	.55
2 or more ED visits, *N* (%)	143 (6.8)	45 (12.3)		107 (13.4)	
Crude relative risk (95% CI)	Ref	1.83 (1.33 to 2.48)	<.001	2.03 (1.61 to 2.55)	<.001
Adjusted relative risk (95% CI)‡	Ref	1.44 (1.01 to 2.02)	.04	1.34 (1.00 to 1.79)	.05

* *Physicians visits included office, clinic, and ED visits (excluding those visits that resulted in a hospital admission).*
† *Among patients with at least 1 visit.*
‡ *Adjusted for age, gender, race, self-reported physical and mental health, number of chronic diseases (hypertension, diabetes, lung disease, heart disease, stroke, arthritis, and cancer), smoking (past and current), current alcohol use, body mass index, study site, and months enrolled during the first year.*
ED, emergency department; CI, confidence interval; Ref, referent.

with inadequate health literacy had higher rates of ED use. The differences in ED use found in multivariate analyses were of borderline statistical significance, and they were not adjusted for multiple comparisons. Nevertheless, our analyses raise the question of whether some ED visits by individuals with low health literacy may substitute for routine office visits. If true, this could be caused by patients with low health literacy having more difficulties accessing their primary care physician. Alternatively, higher rates of ED use could be due to individuals with inadequate health literacy being less able to handle acute health problems on their own. Their physicians also might have more difficulty

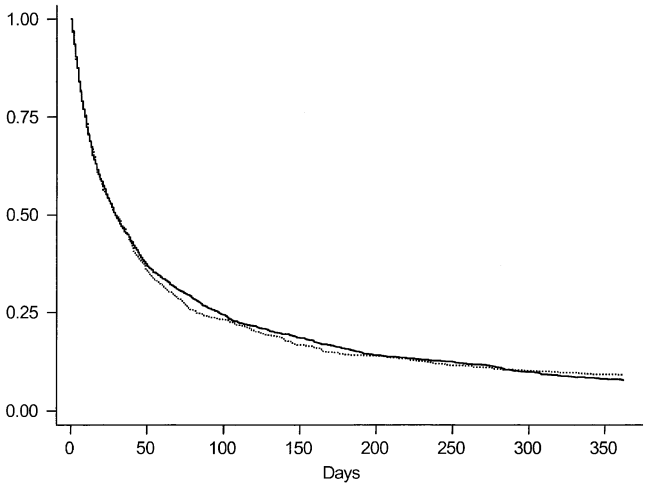

FIGURE 1. Kaplan-Meier curves for the proportion of participants remaining enrolled without a physician outpatient visit for those with adequate (solid line) and inadequate literacy (dashed line). Individuals with marginal literacy had a similar survival curve and are not shown.

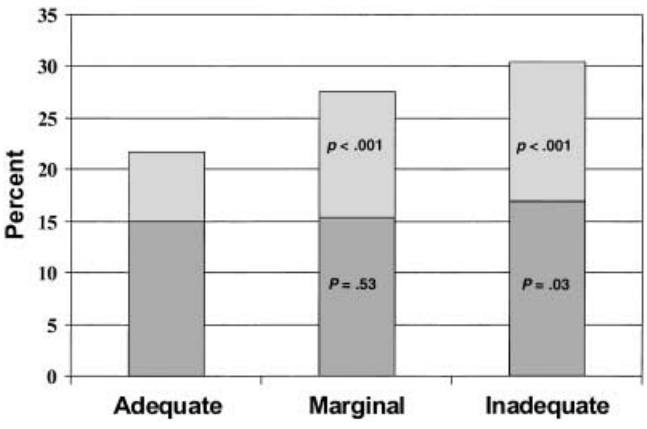

FIGURE 2. Percentage of participants with 1 ED visit (dark gray) and 2 or more ED visits (light gray) in the year after enrollment by literacy level. Emergency department visits included all visits within 12 months of enrolling in the managed care plan. Visits that resulted in a hospital admission were excluded. Literacy was measured by the Short Test of Functional Health Literacy in Adults. The *P* values are for comparisons of the proportion of individuals with (a) 1 or (b) 2 visits, with the adequate literacy group as the referent.

communicating with patients with inadequate health literacy over the telephone and feel more comfortable sending them to the ED to be evaluated.

There are several important caveats and limitations to this study. We examined only the time to first visit, the risk of having no visit, and the mean number of visits. Patients with inadequate health literacy may be more likely to delay care when ill, and our study methods would not have detected this. Such delays in seeking care could also contribute to higher rates of ED use. We also did not examine differences in the use of specialty care, because this information was not reliably recorded in our administrative data. We did not measure enrollees' perceptions of their difficulty obtaining care and their satisfaction with the care they received. This study examined health care use only during the first year after enrollment, and it is possible that use patterns differ over longer time periods. Only half of all eligible enrollees participated in the study, and it is possible that the relationship between health literacy and health care use would have been different among those who did not participate. Finally, even though the mean number of visits did not vary by literacy, it is possible that there were important differences in the quality of care for these visits.

Information about ED visits was based only on administrative data. No chart reviews were conducted. Therefore, we could not determine whether the severity of illness on presentation to the ED differed by literacy level. We did not attempt to examine differences in the urgency of ED visits using administrative data, as some investigators have done previously.[29] Billing codes are very imprecise indicators of the true urgency of a patient's visit,[29] and the validity of this approach is questionable.[30]

Although our findings suggest that inadequate literacy does not adversely affect the total number of outpatient physician visits, it is still important to try to make the health care system less intimidating, more understandable, and easier to navigate for individuals with inadequate health literacy. Although interventions to address these issues are unlikely to affect outpatient physician use, it may still be possible to improve communication with patients' health care teams and increase patients' satisfaction with their care.

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